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Not science...not support: forensic solutions to investigative problems

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Introduction

This presentation is about forensic investigation. Forensic investigation is not the same as scientific support. My purpose is to explain the differences between forensic investigation and scientific support and with reference to the recent history of scientific support, why forensic investigation is an obvious and essential development.

The purpose of Kent Police Forensic Investigation Department is to provide forensic solutions to investigative problems. The words forensic, solution, investigate and problem encapsulate the key issues:

Investigate: to enquire into, especially a crime or a death; to study systematically.

Problem: a puzzle or question that is difficult to deal with or overcome.

Solution: a specific answer to or way of solving a problem.

Forensic: of or used in connection with a court of law, especially in relation to crime; of or employing forensic science.

Support versus investigation

In Figure 1 the words highlight the differences between scientific support and forensic investigation. Above all forensic investigation is about thinking, logically, laterally, creatively, intuitively and contextually.

Support	v	Investigation
Passive		Active
Process		Problem
Logical		Lateral, Logical
Constrained		Creative
Isolated		Integrated
Low Risk		Higher risk
Functional		Cross functional
Outputs		Outcomes

FIGURE 1 Differences between 'scientific support' and 'forensic investigation'.

Three phases of scientific support

If you examine the development of scientific support over the past 20 or so years you can easily identify three phases (Figure 2).

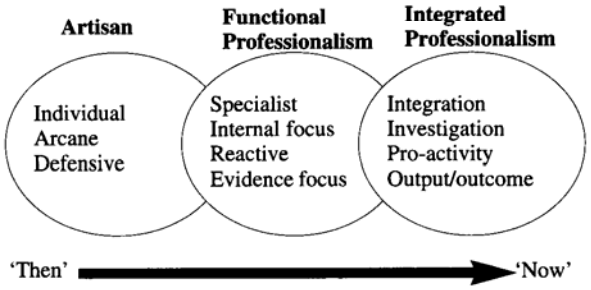

FIGURE 2 The three phases of scientific support.

The first phase I would describe as the 'artisan' phase. The various specialisms which make up scientific support were in their embryonic stages. In this phase you were highly dependent on individuals. This was mainly due to a lack of systems and structured training and recruitment practices. Practitioners had a tendency to be defensive, kept their trade secrets to themselves and developed their own methods.

In the 1980s, the second phase was a great flourish into what I would describe as 'functional professionalism'. Better training and understanding of specialist fields reflected the growing significance of forensic evidence to the courts. The downside of this was that practitioners became increasingly focused on their own specialism and divorced from their principal purpose: the investigation of crime. This reductionist approach meant that they became less able to communicate with each other let alone with police investigators.

In this phase, technological development of individual areas of activity became the main focus for experts, but this was not always beneficial to the overall outcome. This is still a problem today. Two very impressive developments in recent years have been NAFIS and the national DNA database. However, in 1999, after almost five years of the National DNA database, it is still not optimised. This is because our ability to develop technologically has outstripped our ability to implement and optimise the benefits of the technology to crime investigation. I do not believe

that it is possible to optimise these systems within traditional scientific support structures and working practices.

The third phase of scientific support (integrated professionalism) is where we are now (or what we should be aiming for). This is characterised by integration of specialist skills into the investigative process and focus of organisational outputs.

The purpose of this paper is constructive. I would like to explain how I think one can move into this third phase. There are three essential elements to effective provision of forensic investigation. Firstly, develop a forensic investigative capability (an organisational not departmental capability). Secondly, use a systems approach. That is, think and see things as wholes, look for inter-relationships and work across traditional boundaries. Thirdly, link forensic activities to effectively resourced organisational strategies, and measure organisational outputs. DNA hits or fingerprint identifications simply tell you how busy you are. Detected crimes gained from these outputs are better measures of organisational productivity and impact.

In this paper I intend to concentrate on the first of these three elements: forensic investigation.

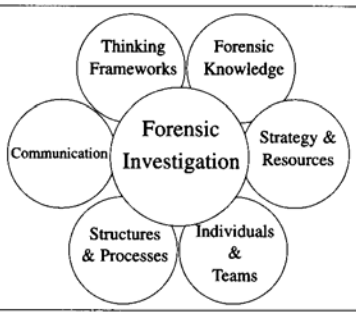

FIGURE 3 The forensic investigation model of current thinking at Kent County Constabulary.

Forensic investigation model

Figure 3 encapsulates the current thinking in Kent County Constabulary.

This model is about developmental issues embedded in good management practice. The developmental issues are not fixed, they will vary between police forces and in any one force at different times.

Issues should be identified, prioritised and tackled on an assessment of risks versus benefits. There is no fixed sequence of activity.

The model is about what is actually done, not what you think is done. Therefore you must establish what is being done and this may be more difficult than you think.

I intend only to examine three aspects of the forensic investigation model: forensic knowledge, thinking frameworks and communication.

Forensic knowledge

By forensic knowledge I mean the full extent of technical or specialist knowledge ranging from pathology to fingerprints. I draw a distinction between 'forensic awareness' (a generalised knowledge of what laboratories or other specialists can provide, often delivered in a short classroom session) and forensic knowledge. Forensic knowledge needs to be targeted, structured, sustained and measured. It is an ongoing and live issue for practitioners.

Forensic knowledge is specific detailed knowledge covering key areas such as:

- the potential investigative value of forensic tests
- the benefits and potential drawbacks of complementary tests
- how relevant material is recovered and stored and how this will impact on the investigation
- how contamination is prevented and how a risk assessment of this can be made
- how long evidential recovery and analysis may take
- how much examinations or advice cost (this applies principally in volume crime)
- who or where to obtain services from
- what information specialists need to optimise the examination and the results.

In Kent the locus of this knowledge is the Forensic Investigation Department. I do not believe it is possible, practical or effective to invest this level of knowledge in every police officer in the Force. This therefore raises the question of how you apply this knowledge to the investigative process?

Thinking frameworks

During the Forensic Science Service Human Identification conference in London, 1999, I attended the DNA interpretation sessions. In a wide-ranging debate there was general agreement by the presenters on three areas which were important to forensic investigation, interpretation and decision making. These were: having a thinking framework, identifying the correct question to ask and understanding the context.

In Kent the idea of gap analysis is used as a thinking framework. Gap analysis enables identification of the right questions to ask and to an understanding of the case context. It also leads to identification of the specific forensic needs of the case. Every case is different. Forensic Investigation in Kent deal with over twenty thousand crime scenes per year. To sustain this type of activity in volume crime means the process needs to be clear, understood, owned and managed. Forensic tests need to be agreed between the forensic investigator and police investigator and results of these tests need

to be monitored and evaluated. The evaluation is probably the simplest part of the process but the part where it most frequently goes wrong.

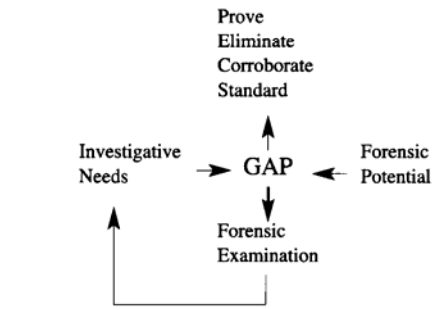

FIGURE 4 Schematic diagram of gap analysis.

Gap analysis

Gap analysis (Figure 4) begins with the police investigator recognising the need for forensic evidence. A Crime Scene Investigator (formerly Scenes of Crime Officer) is contacted and together they address three key areas.

Firstly, given the current context (witness information, intelligence, evidence etc), what is the gap between what is known (or can be proved) and what is required? In other words, what do you have already and what more is needed? Defining investigative needs is achieved by addressing the following questions:

What do I need to prove?
What do I need to eliminate?
What do I need to corroborate?
What standard of proof is required?

Secondly, what is the forensic potential of the scene or scenes: shoemarks; fingermarks; DNA; video; audio; intelligence etc? This is referred to colloquially as opening the 'forensic toolbox'. The available forensic potential is then explored in terms of its ability to close the investigative gap. Can the needs be met? What are the best ways of doing this and what is the quickest, cheapest and lowest risk? For example, if identification of an individual is needed this can only be done directly by DNA and fingerprints. However, shoemarks, or tool-marks may provide sufficient corroborative evidence in other contexts to indirectly identify someone.

Thirdly, what information is required by the specialist carrying out the examination in order to understand the case, enable interpretation and optimise value of results? This is referred to as 'critical' information and will vary with evidence type. For example, with trace evidence it is essential to inform the scientist when clothing was seized and what is specifically alleged. In a case involving glass trace evidence, the critical information includes how the glass was broken and the position of the alleged offender relative to the source of broken glass.

Finally, this process needs to re-cycle and iterate as forensic results are obtained. Do they meet the case needs or is further work required? Is any further work possible?

The benefits of gap analysis are: it provides a thinking framework; ensures the correct questions are addressed; captures contextual information; defines processes and provides clarity; is structured and therefore can be measured and evaluated. The main drawback of gap analysis is that in the initial learning stages it is bureaucratic. However, this should recede with familiarity and practice.

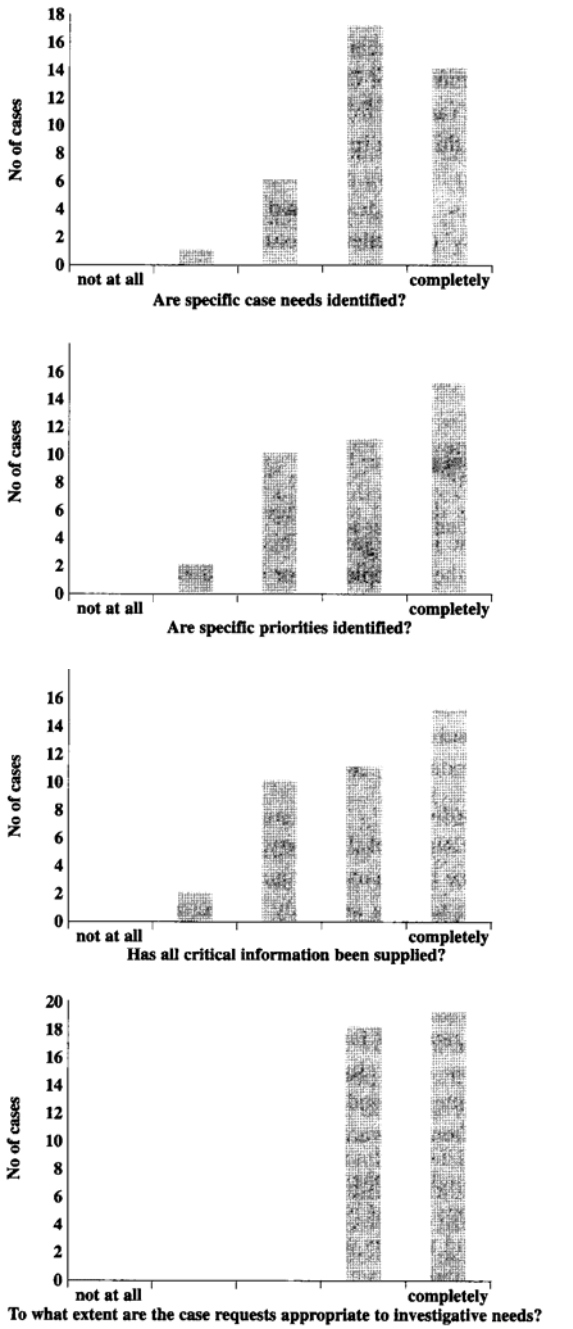

FIGURE 5 Quality of submissions to FSS as assessed by FSS Volume Crime Specialist Adviser.

Supporting evidence

Figure 5 provides supporting evidence for the effectiveness of this approach in volume crime (mainly burglary and car crime). The charts show data from a joint Kent Police, Forensic Science Service project. The project covered a wide range of issues not all of which are addressed here. If you think back to what I said in relation to the forensic investigation model, one of the central issues is to establish what your current position actually is. To do so needs reliable data. This part of the project benchmarks the quality of submissions to the Forensic Science Service (FSS). The data in the charts is based on the assessment of the FSS Volume Crime Specialist Adviser. In each chart the Y axis indicates number of cases and the X axis represents a five point scale ranging from poor to excellent. I do not propose to analyse this data in detail and would suggest the overall distribution is all we need consider for the purposes of this presentation. The ideal would be for all cases to be in the 'completely' ('excellent') column.

In fact all of the charts show that the distribution is skewed towards 'excellent' and the majority of cases are above average. However, in some instances there are a very small number of cases which are below average quality for a particular aspect. The exception to this is the final chart which is in my view the most important one. This asks: are the submissions made capable of solving the investigative problem as defined and agreed by the police investigator and forensic investigator? This data shows that the requests were all either completely, or almost completely, appropriate. An overall summary of the data is that it shows that the process results in good (occasionally very good) quality submissions but there is room for improvement. In other words, gap analysis can be used as a tool to benchmark quality of submission. In addition, it is also an indication of value for money.

Communication

The third element of the forensic investigation model which I would like to discuss is communication. I consider communication to be a seriously neglected area which if not addressed will prevent optimisation of forensic investigation. This is an area which I believe requires research. Individuals perceive the world in different ways depending on a wide range of factors such as: education, personality, social class, and religious and political beliefs [1]. This results in 'mental models' of how the world works of which they are often unaware.

A corresponding phenomenon applies in professions and organisations. What is 'right' and what is 'wrong', what is possible and what is not; is defined in terms of a paradigm [2]. The paradigm is a set of beliefs in relation to behaviour, based on a common but unstated understanding and interpretation of the world. It is similar to organisational culture but is deeper in that it defines reality.

It will come as no surprise to readers if I suggest that the police service, legal profession and scientific community have different mental models. A major area of mis-communication is the notion of 'common sense' – something which is used by the police and legal system a great deal. However, science is not common sense and it is often counter intuitive. I can think of a particular instance in a trial where it was put to me repeatedly that it was common sense, what I should have found in my examination. Of course I did not find what was expected (by the lawyer). What I found was the opposite of what was expected (by the lawyers and police officers) but was entirely explicable and logical to me.

These issues are compounded by a view of science in the police service and legal profession which is 'romantic': i.e. that science is totally objective, context free and certain. Interpretations of forensic evidence are invariably ambiguous and a great deal of effort is spent trying to assess the degree of ambiguity and the most likely explanation. The difficulty is that this lack of shared understanding between police, lawyers and scientists leads to unrealistic expectations and unrealistic expectations lead to confusion, uncertainty and sometimes lack of trust. I would suggest that anything which can potentially undermine trust should be treated very seriously.

Of course it's not all the fault of the lawyers and police officers. Scientists play their part too!

> *"Efforts to promote the public understanding of science hve been going on for over 10 years now, but there is no clear agreement on what is meant by 'public' 'understanding' or 'science' in this context."* [3]

Summary and conclusions

I have described forensic investigation and explained why this is a natural development from scientific support. I have identified how this can be achieved (certainly how it is approached in Kent) and the potential benefits of this approach.

Forensic investigation is characterised by thinking, convergently and divergently in the context of a criminal enquiry. It is also about effective communication of needs and potential, and the evaluation of outcomes. It is not science and not support but the provision of forensic solutions to investigative problems.

Acknowledgements

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